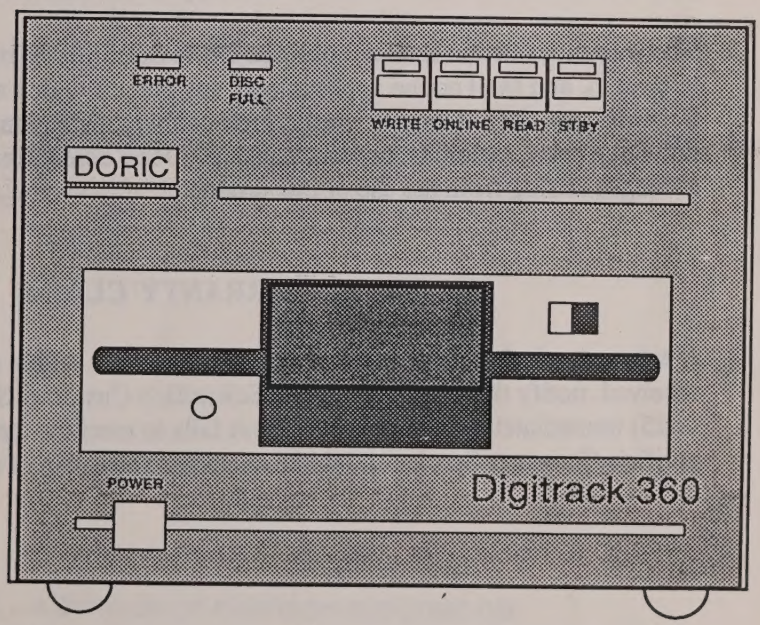
DORIC

Digitrack™ 360

DATA STORAGE UNIT



DORIC SCIENTIFIC DIVISION
EMERSON ELECTRIC CO.
3883 RUFFIN ROAD
SAN DIEGO, CA 92123-1898
(619) 565-4415

OPERATION MANUAL

WARRANTY

Doric Scientific hereby warrants each Digitrack™ 360 data storage unit as follows:

1. At the time of delivery of of each unit to the original purchaser, Doric Scientific UNCONDITIONALLY WARRANTS that it shall be free from defects in parts, materials, and workmanship; and

2. Commencing with the date of shipments of each unit to the original purchaser, Doric Scientific UNCONDITIONALLY WARRANTS that each unit shall remain free from defect in parts, materials, and workmanship for a period of one year.

In the event any unit fails to meet the terms of this warranty, Doric Scientific agrees to provide corrective action. Refer to Warranty Claim below for proper procedure.

The warranties herein shall not obligate Doric Scientific in any manner whatsoever with respect to, and shall not be applicable to, any defects which after an inspection by Doric Scientific are not to Doric Scientific's reasonable satisfaction demonstrably the result of defective parts, materials, or workmanship. Doric Scientific is not liable for consequential damages arising from the use of this product.

WARRANTY CLAIM

If either physical damage is found or operation is not within specification when the unit is received, notify the carrier and Doric Scientific's Customer Service Department (619 565-4415) immediately. In the event the unit fails to meet the terms of this warranty, Doric Scientific's Customer Service should be contacted for a plan of corrective action.

Digitrack™ 360

Data Storage Unit

Operation Manual

DORIC SCIENTIFIC. . .A DIVISION OF EMERSON ELECTRIC CO.
3883 Ruffin Road, San Diego, Calif. 92123-1898, Phone (619) 565-4415, TELEX 249031

EUROPEAN HEADQUARTERS. . .ROSEMOUNT A. G.
P.O. Box 363, Arbachstrasse 2, CH-6340, Baar-Inwil, Switzerland
Phone (41) (42) 33-37-77, TELEX 868923

Manual 360-4000-00B

© 1986 Doric Scientific

Printed in U.S.A.

Digitized by the Internet Archive
in 2026

https://archive.org/details/manualsplus_13061

CONTENTS

CHAPTER 1 *INTRODUCTION*

CHAPTER 2 *SPECIFICATIONS*

CHAPTER 3 *INSTALLATION*
Initial Start-up and Test
Unit Location
Maintenance

CHAPTER 4 *CONFIGURATION, HOOKUP, AND DATA LOGGER APPLICATIONS*
Using the Digitrack™ 360 with the Minitrend™ 205 Data Logger
Using the Digitrack™ 360 with the Digitrend® 235 or Digitrend® 245 Data Logger

CHAPTER 5 *OPERATION*
Introduction
Front Panel Operation
Media
Interface Configuration
Online/Offline
Standby and Error Clearing
Preparing a New Disk (Formatting)
Writing
Reading

CHAPTER 6 *DATA CONTROL (HANDSHAKING)*
Introduction
Input Handshake
Output Handshake

CHAPTER 7 *COMMANDS*
Control Codes
Mnemonic Commands
Status String
Directory
Transparent Mode

CHAPTER 8 *SPECIAL OPERATING FEATURES*
Autoanswer Operation
Monitor

CONTENTS *(continued)*

CHAPTER 9 *TIPS ON REMOTE OPERATION USING SOFTWARE COMMANDS*

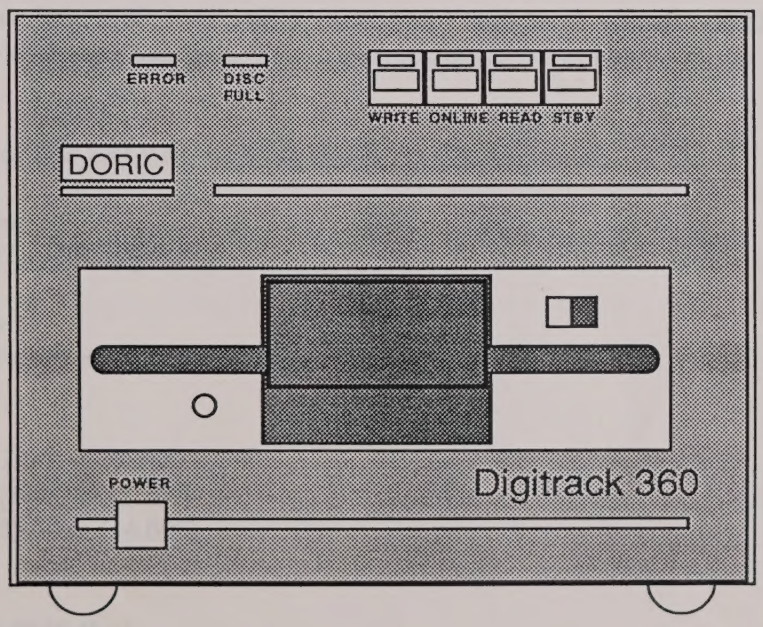
APPENDIX
Control Codes
Mnemonic Commands
Directory Format
Status String Format
Quick Switch Reference
Baud Rate Table
Using the Conversion Program

Chapter 1
INTRODUCTION

The Digitrack™ 360 is a stand-alone, random access, data storage unit which is offered as a peripheral accessory for the following Doric data loggers: Minitrend™ 205, Digitrend® 235, and Digitrend® 245. The unit has two RS-232/CCITT V.24 interfaces which can be used to fully control the reading and writing of data to a 5 1/4" floppy disk.

The unit can be controlled by the use of front panel buttons or remotely by ASCII control characters and/or mnemonic commands. The unit has the necessary intelligence to control the formatting of data into files releasing the host of the requirement of writing a disk operating system.

The Digitrack™ 360 has been designed for a wide range of applications including Bulk Data Logging, Data Transfer, Communications Store and Forward, and Message Handling. As the software resides permanently within the unit, no special loading operations or programming disks are required. Disks may be formatted on the unit allowing the use of non-preformatted disks. The format used is directly compatible with the IBM PC† .



† IBM is a registered trademark of International Business Machines Corp.

Chapter 2
SPECIFICATIONS

Disk Drive Capacity

Unformatted: 500 kbytes
Formatted: 360 kbytes

Media

5 1/4" double-sided, double density, 40-track, soft sectored floppy diskettes.

Memory

16k ROM 8k RAM

Serial Interfaces

Two EIA RS-232C/CCITT V.24 ports (20 mA current loop optional)

Serial Format

Either 7-bit ASCII with selectable odd/even parity or 8-bit binary data.
Both in 8-unit teletype code with 1 or 2 stop bits.

Serial Data Rates

110, 150, 300, 1200, 2400, 4800, 9600, and 19200 baud—independently selectable for each interface.

Power Supply

90-130 or 180-260 VAC @ 50 or 60 Hz, 50 VA maximum.

Temperature Range

10-50 °C, media dependent.

Humidity Range

8-80% Relative Humidity, non-condensing.

Dimensions

Width: 18.4 cm (7.25")
Height: 14.0 cm (5.50")
Depth: 35.5 cm (14.00")

Weight

4.15 kg (9.15 lbs.)

Chapter 3
INSTALLATION

Initial Start-up and Test

1) Remove the transit card from the disk drive.

2) Ensure that all back panel switches are OFF, i.e. set to "0" position.

3) Connect the power cord to the unit's back panel power plug. Then plug the other end of the cord to an active AC outlet and switch the unit on—the rocker switch controlling power is on the back panel next to the power plug socket.

4) Observe that all front panel indicators, except the disk drive indicator, light momentarily and that the ONLINE and STBY indicators stay lit.

5) Insert a spare non-write protected disk in the drive. Then press and hold the WRITE and STBY buttons for 5 seconds.

6) On release of the switches, observe that the drive indicator and WRITE indicator are on and the STBY indicator is off.

7) After a short time, the WRITE indicator will go out and the STBY indicator will light. A disk has now been successfully formatted.

If any other results than those described above are encountered, ensure that the correct type of disk has been used, and that it is not write-protected; try the same procedure with another disk. A write-protected disk is one which has the notch in the disk packet covered. (Refer to Chapter 5 for a description of the 5 1/4" floppy disk.) If the unit is still not working correctly, call our Customer Service department for assistance: (619) 565-4415.

UNIT LOCATION

Place the unit such that air circulation is allowed on all sides. Due to the nature of the media, extremes of temperature, humidity, or very dirty areas should be avoided. In common with all electrical equipment, the unit should not be placed in direct sunlight on a window sill as the temperature inside the cover may rise, exceeding its operational limit.

MAINTENANCE

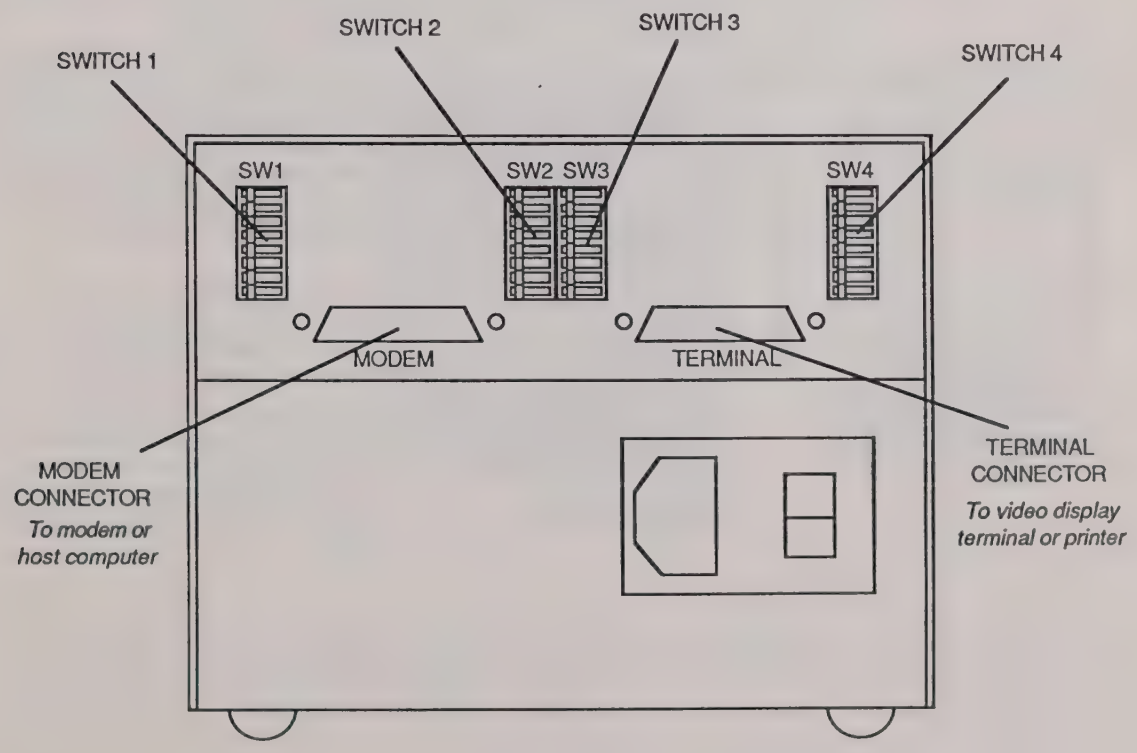
The only recommended maintenance is the cleaning of the floppy disk heads using a commercially available floppy disk head cleaning kit. Head cleaning should normally be no more frequent than once every six months. For maximum head life, we recommend that the heads be cleaned only when the unit starts to show read errors.

Chapter 4
CONFIGURATION, HOOKUP, AND DATA LOGGER APPLICATIONS

Miniature slide switches on the back panel are used to set up the operation of both RS-232 interfaces and to effect certain operations within the unit. Operation of these switches is fully explained in this chapter and handily summarized at the back of this manual. Also at the back panel are two female, 25-pin D-type connectors which are used for the serial interface hookup. The pin assignments for these connectors are tabulated in this chapter.

Also in this chapter are configuration and hookup instructions for a Digitrack™ 360/Doric data logger system. Though general guidlines for operating the system are also given, *read through Chapter 5 to familiarize yourself with all aspects of the unit's operation.*

CONFIGURATION SWITCHES AND CONNECTORS



	SWITCH 1							
	Terminal BAUD RATE			Modem BAUD RATE			CRC	
FUNCTION	1	2	3	4	5	6	7	8
110 baud	OFF	OFF	OFF	OFF	OFF	OFF	x	UNUSED (SET OFF)
150 baud	ON	OFF	OFF	ON	OFF	OFF	x	
300 baud	OFF	ON	OFF	OFF	ON	OFF	x	
1200 baud	ON	ON	OFF	ON	ON	OFF	x	
2400 baud	OFF	OFF	ON	OFF	OFF	ON	x	
4800 baud	ON	OFF	ON	ON	OFF	ON	x	
9600 baud	OFF	ON	ON	OFF	ON	ON	x	
19.2 kbaud	ON	ON	ON	ON	ON	ON	x	
No CRC Check	x	x	x	x	x	x	ON	
CRC Check	x	x	x	x	x	x	OFF	

x = don't care

SW1-1 through SW1-6: Baud Rate
Use these switches to set the baud rate for the RS-232 interfaces (Modem and/or Terminal) as required. See switch table.

SW1-7: CRC
Set OFF for automatic verification of data read from or written to disk. Set ON for no checking of data.

SW1-8: Unused switch

	SWITCH 2							
			OUTPUT CONTROL		CHARACTER FORMAT			
FUNCTION	1	2	3	4	5	6	7	8
No Line Control	UNUSED (SET OFF)		OFF	x	x	x	x	x
Line Control			ON	x	x	x	x	x
No Delay After CR			x	OFF	x	x	x	x
250 mS Delay After CR			x	ON	x	x	x	x
Parity			x	x	OFF	x	x	x
No Parity			x	x	ON	x	x	x
Odd Parity			x	x	OFF	OFF	x	x
Even Parity			x	x	OFF	ON	x	x
MODEM, 1 Stop Bit			x	x	x	x	OFF	x
MODEM, 2 Stop Bits			x	x	x	x	ON	x
TERM., 1 Stop Bit			x	x	x	x	x	OFF
TERM., 2 Stop Bits			x	x	x	x	x	ON

x = don't care

SW2-1 and SW2-2: Unused switches

SW2-3: Line Control
Applies to READ mode only. Set ON for line by line output of file. Line is 80-characters long, ending in line feed (LF) and carriage return (CR). ASCII DC1 (Xon) required to output each line (unit remains in READ mode). Set OFF for no line control (continuous output).

SW2-4: CR Delay
Applies to READ mode only. Set ON for 250 mS delay of data output after unit transmits CR. Set OFF for no delay.

SW2-5 through SW2–8: Character Format
Use these switches to configure the required character format (no parity or odd/even parity with 1 or 2 stop bits). See switch table.

	SWITCH 3							
FUNCTION	1	2	3	4	5	6	7	8
Front panel ENABLED	OFF	x	x	x	UNUSED (SET OFF)	Input Handshake, see table in Chapter 6	x	Output Handshake, see table in Chapter 6
Front panel DISABLED	ON	x	x	x			x	
Non-continuous Write	x	OFF	x	x			x	
Continuous Write	x	ON	x	x			x	
Modem interface (Online) @ power up	x	x	OFF	x			x	
Terminal interface (Offline) @ power up	x	x	ON	x			x	
Power Fail Recovery DISABLED	x	x	x	OFF			x	
Power Fail Recovery ENABLED	x	x	x	ON			x	
Xon/Xoff Input Control DISABLED	x	x	x	x			OFF	
Xon/Xoff Input Control ENABLED	x	x	x	x			ON	

x = don't care

SW3-1: Front Panel Lockout
Set ON to lockout (disable) all front panel switches. Set OFF to enable front panel switches.

SW3-2: Continuous WRITE
Set ON to continue writing of a file to a new disk when disk becomes full. Set OFF to quit WRITE and close file being written when disk becomes full.

SW3-3: Controlling Interface at Turn On
Set ON to give initial control of the unit to the Terminal interface when unit is turned on. Set OFF to give initial control of the unit to the Modem interface when unit is turned on.

SW3-4: Power Fail Recovery
Set ON for battery backup of unwritten data and machine status when power fails in the middle of WRITE—unit continues in WRITE when power resumes. Set OFF for no power fail recovery.

SW3-5: Unused switch

SW3-6: Input Handshaking
Use this switch to select the hardware line required for input control. Set ON for active CTS and RTS on the terminal and modem interface respectively. Set OFF for active DSR and DTR on the terminal and modem interface respectively. See switch table in Chapter 6.

SW3-7: Xon/Xoff Control
Set this switch ON for unit to send Xon/Xoff as required when writing data. Set OFF for no Xon/Xoff control of data.

SW3-8: Output Handshaking
Use this switch to select the hardware line required for output control. Set ON for active RTS and CTS on the terminal and modem interface respectively. Set OFF for active DTR and DSR on the terminal and modem interface respectively. See switch table in Chapter 6.

	SWITCH 4							
FUNCTION	1	2	3	4	5	6	7	8
Half Duplex	OFF	x	x	x	x	UNUSED (SET OFF)	x	x
Full Duplex	ON	x	x	x	x		x	x
Monitor for ONLINE	x	OFF	x	x	x		x	x
No Monitor for ONLINE	x	ON	x	x	x		x	x
ASCII Data Recording	x	x	OFF	x	x		x	x
Binary Data Recording	x	x	ON	x	x		x	x
No Autoanswer Monitor	x	x	x	OFF	x		x	x
Autoanswer Monitor	x	x	x	ON	ON		x	x
Autoanswer OFF	x	x	x	x	OFF		x	x
Autoanswer ON	x	x	x	x	ON		x	x
Normal Modem Intf.	x	x	x	x	x		OFF	x
Transparent Modem Intf.	x	x	x	x	x		ON	x
Normal Terminal Intf.	x	x	x	x	x		x	OFF
Transparent Terminal Intf.	x	x	x	x	x		x	ON

x = don't care

SW4-1: Duplex Operation
Set ON for duplex operation. Set OFF for half duplex operation. This switch is also used with online and monitor switches as shown in the communication configuration table in the appendix.

SW4-2: Monitor
Set ON to view (monitor) data on the Terminal interface as it is received on the Modem interface (unit ONLINE). Set OFF for no monitor.

SW4-3: ASCII/Binary Data Recording
Set ON to record binary data. Set OFF to record ASCII data (bit 8 set to zero).

SW4-4: Autoanswer Monitor
Applicable to autoanswer modem operation only (SW4-5 set ON)—set ON to use modem to monitor data received on Terminal interface. Set OFF for no autoanswer monitor. Refer to Chapter 8 for information on autoanswer operation.

SW4-5: Autoanswer Mode
Set ON to allow operation with an autoanswer modem. Set OFF for no autoanswer operation. Refer to Chapter 8 for autoanswer operation.

SW4-6: Unused switch

SW4-7: Transparent Mode, Modem
Set ON to make Modem interface "transparent" to control codes and mnemonic commands—all data is recorded as is on the disk. Set OFF for normal operation of Modem interface.

SW4-8: Transparent Mode, Terminal
Set ON to make Terminal interface "transparent" to control codes and mnemonic commands—all data is recorded as is on the disk. Set OFF for normal operation of Terminal interface.

Modem Interface Connector

PIN NUMBER	SIGNAL	INPUT OR OUTPUT
1	FG: Frame Ground	—
2	TD: Transmit data from unit	Output
3	RD: Received data to unit	Input
4*	RTS: Request to Send	Output
5**	CTS: Clear to Send	Input
6**	DSR: Data Set Ready	Input
7	SG: Signal Ground	—
20*	DTR: Data Terminal Ready	Output

* Input handshake: RTS (SW3/6 ON) or DTR (SW3/6 OFF) output.

** Output handshake: CTS (SW3/8 ON) or DSR (SW3/8 OFF) input.

Note: All unconnected handshaking input pins pulled high

Terminal Interface Connector

PIN NUMBER	SIGNAL	INPUT OR OUTPUT
1	FG: Frame Ground	—
2	TD: Transmit data to unit	Input
3	RD: Received data from unit	Output
4*	RTS: Request to Send	Input
5**	CTS: Clear to Send	Output
6**	DSR: Data Set Ready	Output
7	SG: Signal Ground	—
8	DCD: Data Carrier Detect	Output
20*	DTR: Data Terminal Ready	Input

* Output handshake: RTS (SW3/8 ON) or DTR (SW3/8 OFF) input.

** Input handshake: CTS (SW3/6 ON) or DSR (SW3/6 OFF) output.

Note: All unconnected handshaking input pins pulled high

USING THE DIGITRACK™ 360 WITH THE MINITREND™ 205 DATA LOGGER

Recommended switch settings for a Digitrack™ 360/Minitrend™ 205 system are given below. A switch setting with the "As Required—system" comment is a suggested setting. This means you may change this setting *as required* for your particular *program or system.* Similarly, a switch setting with the "As Required—configuration" comment is a suggested setting. This means you may change this setting *as required* for the *Digitrack™ 360's switch configuration.* Mandatory switch settings are given without comments.

Minitrend™ 205 Serial I/O Card Switch Settings (please refer to data logger manual):
NOTE: Initially set all switches to the OFF position.

SWITCH		DESCRIPTION	COMMENTS
S1-2,4	ON	12 fields per line	As Required—system
S2-4	ON	CR/LF sent	
S2-5	ON	DC2/DC4	As Required—configuration
S2-6	ON	ASCII Separators included	
S3-4,6	ON	No Parity, 8-bit, 1 stop bit	
S3-7	ON	Simplex only	As Required—configuration
S4	NA	Current Loop	Not Applicable
S5-1	ON	9600 baud	As Required—system

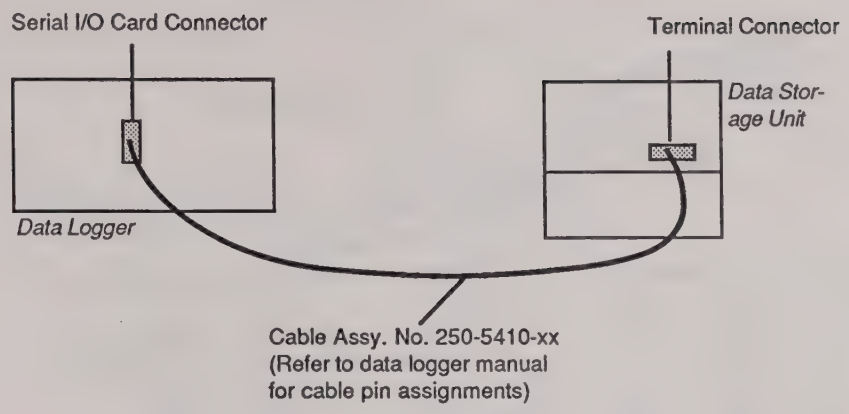
Digitrack™ 360 Rear Panel Switch Settings:
NOTE: Initially set all switches to the OFF position.

SWITCH		DESCRIPTION	COMMENTS
SW1-2,3	ON	9600 Baud (Terminal)	As Required—system
SW1-4,5	ON	1200 Baud (Modem)	As Required—system
SW2-3	ON	80 Characters/Line	
SW3-3	ON	OFFLINE @ Power On	As Required—system
SW3-4	ON	Power Fail Recovery	
SW3-6	ON	Handshaking	
SW4-2	ON	Monitor	As Required—system
SW4-4	ON	Autoanswer Monitor	As Required—system
SW4-5	ON	Autoanswer	As Required—system

General Information

A maximum of 111 files can be written to a single floppy disk. The maximum size of a file is limited by the editor or program that will use the data. For example, the standard IBM editor can only see the first 55,000 or so characters in the file, all data beyond that is unusable. Keep this point in mind when generating multiple logs in one file. The following information is given as a general guideline since there are alternative ways in which to set up the Digitrack™ 360.

SIMPLEX MODE



Hookup Configuration

Operation

Use the simplex mode if you are not using a terminal or computer to program the data logger (via its serial I/O port).

1. Refer to Minitrend™ 205 operator's manual on Simplex Operation (4.2.2).

2. Insert blank floppy disk in disk drive, then format disk.

3. Using front panel buttons, place Digitrack™ 360 OFFLINE and in WRITE mode.

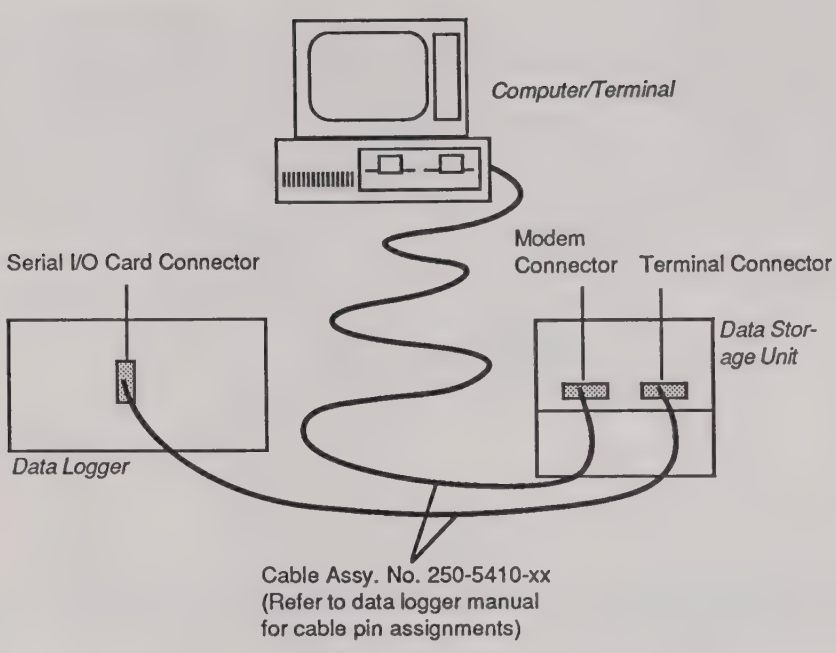
4. Generate log by pressing front panel LOG key on Minitrend™ 205.

5. Place Digitrack™ 360 in STANDBY after log ends. First file, Z001, is now complete.

- As desired, multiple logs can be placed in one file or one log per file. Note that a new file is created each time WRITE mode is entered.

- The Digitrack™ 360 can automatically put itself in the WRITE mode to record a log (whenever it is generated by the data logger) then go to STANDBY when the log ends. In order to do this, configure the data logger's serial I/O card to give a block header and block trailer of DC2 and DC4 respectively (S2-5 set CLOSED/ON).

- The Minitrend™ 205 can be programmed for periodic logging in the usual manner while in the simplex mode. To record periodic logs onto disk, configure the serial I/O to include DC2/DC4 (as mentioned above) or leave the data storage unit in the WRITE mode.

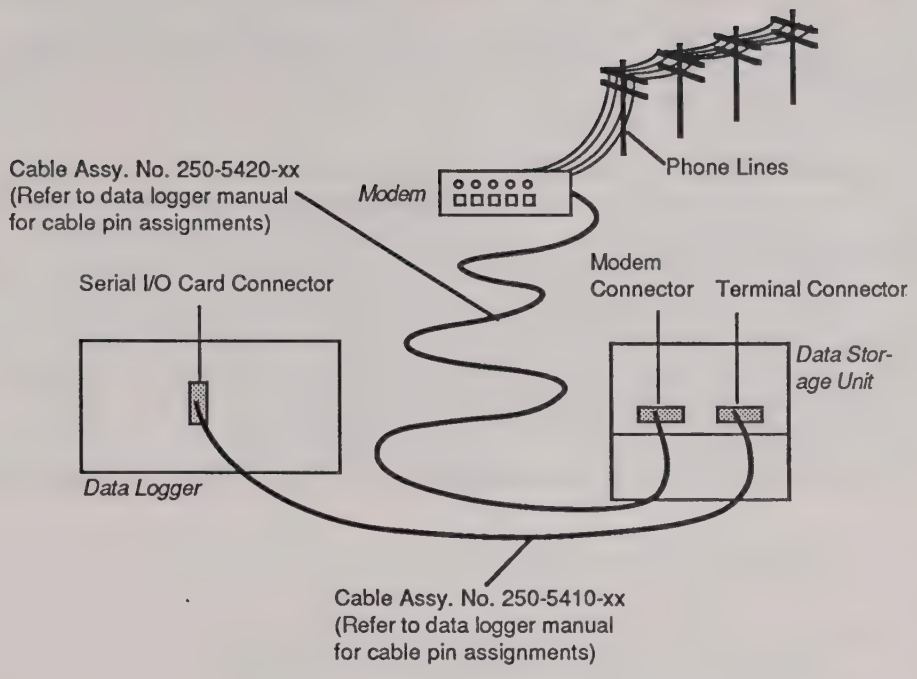


Hookup Configuration

Operation

Operation is similar to that described for simplex mode, except that the data logger can be accessed through its serial port using a computer/terminal connected to the Digitrack™ 360's modem connector. Set switch S3-7 on the data logger's serial I/O card OPEN/OFF.

• With the system hooked up as shown above, place the Digitrack™ 360 in the ONLINE mode via its front panel ONLINE button to access the data logger for logging or programming.



Hookup Configuration

Operation

Operation is basically the same as that described for Duplex mode. Make sure that S3-7 on the data logger's serial I/O card is set OPEN/OFF. We recommend you try modem operation using two local phone lines first (i.e. office extensions). Then, after being familiar with the system and its capabilities, you can confidently transfer data over long distance lines without incurring unnecessary charges.

- If the Digitrack™ 360 is ONLINE when it is called, it will stay ONLINE and you will have access to both the data storage unit and the data logger.

- If the Digitrack™ 360 is OFFLINE when it is called, the unit will go ONLINE and you will have access to the data storage unit only.

- There are two ways to access the Minitrend™ 205 data logger if the Digitrack™ 360 was OFFLINE at callup:

(1) Hang up the modem or send a CONTROL P (you may need to send more than one CTRL-P to have the Digitrack™ 360 hang up its modem). Dial up the unit again—you will then have access to both units.

(2) Start a file which records every command sent to the data logger and the data logger's response (if any) by sending the ;WO *filename* (use an appropriate filename) command. (Refer to Chapter 7 for a complete discussion on mnemonic commands.) With this file, you can record data logged during the communication session. This is also a good way to record how you programmed the data logger if any data logger programming was done over the modem.

- If the Digitrack™ 360 was ONLINE before you called it and you want the unit to be OFFLINE (returned to data logger control) when you hang up, put the unit in the write mode first (send CONTROL R), then hang up modem. If the Digitrack™ 360 was OFFLINE before it was called and you used a ";WO" command to access the data logger, send a CONTROL T to stop WRITE, then hang up the modem—the unit will go OFFLINE. *Hanging up the modem without doing the above causes the Digitrack™ 360 to remain ONLINE, which inhibits the terminal interface.* In this situation, the unit will not record data if the data logger was set for interval logging.

Also refer to Chapter 8 for a complete discussion on the use of an Autoanswering modem.

USING THE DIGITRACK™ 360 WITH THE DIGITREND® 235 OR DIGITREND® 245 DATA LOGGER

The Digitrend® 235 and Digitrend® 245 data loggers are similar in their programming and use. Thus, in this section, we will refer to both data logger models as Digitrend® 235/245. Any difference between the two data logger models will be noted if it applies to the discussion. Refer to the operator's manual for your model data logger for further information on its programming and use.

Recommended programming and switch settings for a Digitrack™ 360/Digitrend® 235/245 system are given below. A program command or switch setting with the "As Required—system" notation means you may change the suggested programming/setting *as required* for your particular *program or system.* Similarly, a program command or switch setting with the "As Required—configuration" notation means you may change or skip the suggested setting/programming *as required* for the *Digitrack™ 360's switch configuration.* ***Mandatory*** **program commands and switch settings are given without comments.**

Programming the Data Logger Serial I/O (Function 100 commands)

1. Unskip points to be used *(as required—system).* The Digitrend® 235 has a range of points from 1 to 100. The Digitrend® 245 has a range of points from 1 to 500.

CLEAR PRGM POINT 1 – 100 SKIP – RUN

2. Default all serial I/O parameters:

CLEAR PRGM FUNC 100 – 2 RUN

3. Enable Terminal 1 port:

CLEAR PRGM FUNC 100 – 2 – 1 – 1 RUN

4. Disable Terminal 2 port if only one port needed (second port optional on Digitrend® 235):

CLEAR PRGM FUNC 100 – 4 – 1 – 0 RUN

5. Program block control *(as required—configuration)*:

CLEAR PRGM FUNC 100 – 2 – 4 – 1 RUN

6. Program lines per block *(as required—system)*.
NOTE: 21 lines per block for 100 points or 101 lines per block for 500 points.

CLEAR PRGM FUNC 100 – 2 – 8 – 21 RUN

7. Program timing nulls *(as required—system)*:

CLEAR PRGM FUNC 100 – 2 – 9 – 0 RUN

Steps 8 and 9 are required if a file is to be opened for each log of data (refer to page 36).

8. Program DC2/CTRL-R (18_{DEC}) block header *(as required—configuration)*:

CLEAR PRGM FUNC 100 – 2 – 19 – 18 RUN

9. Program DC4/CTRL-T (20_{DEC}) block trailer *(as required—configuration)*:

CLEAR PRGM FUNC 100 – 2 – 20 – 20 RUN

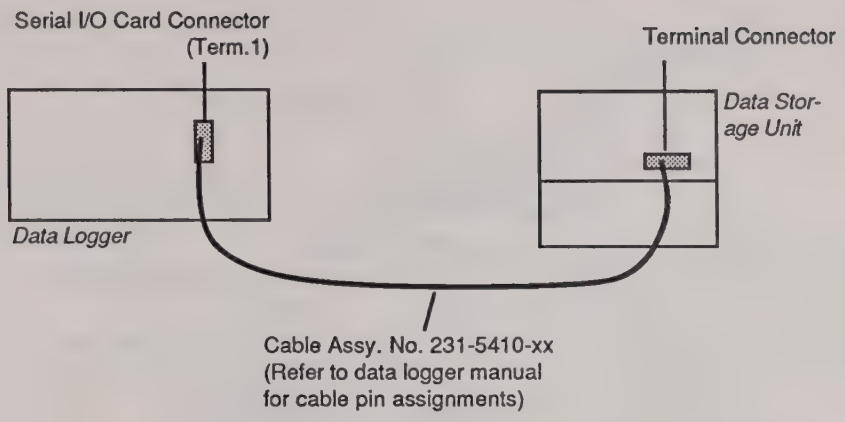
Digitrack™ 360 Rear Panel Switch Settings:
NOTE: Initially set all switches to the OFF position.

SWITCH		DESCRIPTION	COMMENTS
SW1-2,3	ON	9600 Baud (Terminal)	As Required—system
SW1-4,5	ON	1200 Baud (Modem)	As Required—system
SW2-3	ON	80 Characters/Line	
SW3-3	ON	OFFLINE @ Power On	As Required—system
SW3-4	ON	Power Fail Recovery	
SW3-6	ON	Handshaking	
SW4-2	ON	Monitor	As Required—system
SW4-4	ON	Autoanswer Monitor	As Required—system
SW4-5	ON	Autoanswer	As Required—system

General Information

A maximum of 111 files can be written to a single floppy disk. The maximum size of a file is limited by the editor or program that will use the data. For example, the standard IBM editor can only see the first 55,000 or so characters in the file, all data beyond that is unusable. Keep this point in mind when generating multiple logs in one file. The following information is given as a general guideline since there are alternative ways in which to set up the Digitrack™ 360.

SIMPLEX MODE



Hookup Configuration

Operation

Use the simplex mode if you are not using a terminal or computer to program the data logger (via its serial I/O port).

1. Insert blank floppy disk in disk drive, then format disk.

2. Using front panel buttons, place Digitrack™ 360 OFFLINE and in WRITE mode.

3. Give log command to data logger. Using the front panel keys to log 100 points, the command entry is:

CLEAR | LOG | 2 | POINT | 1 | – | 100 | RUN

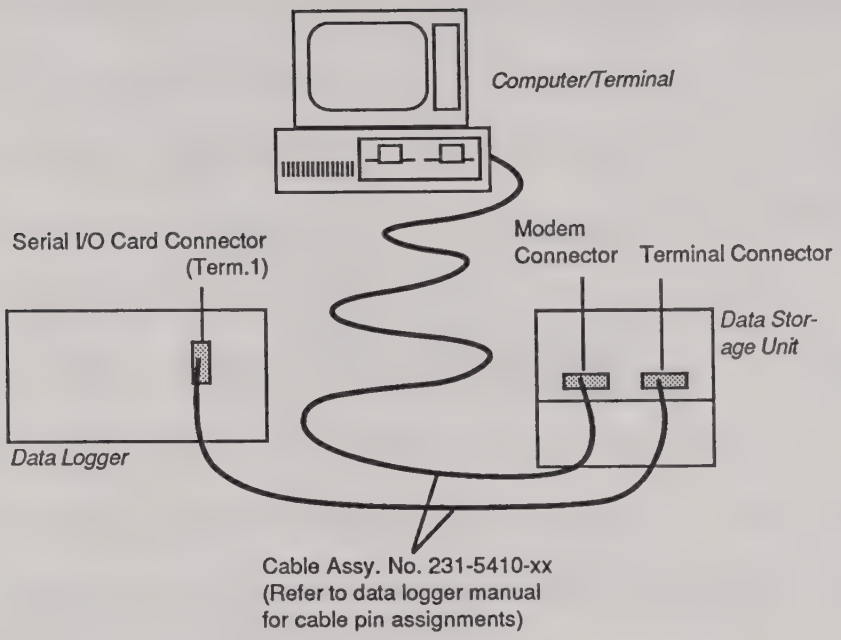
4. Place Digitrack™ 360 in STANDBY after log ends. First file, Z001, is now complete.

- As desired, multiple logs can be placed in one file or one log per file. Note that a new file is created each time WRITE mode is entered.

- The Digitrack™ 360 can automatically put itself in the WRITE mode to record a log (whenever it is generated by the data logger) then go to STANDBY when the log ends. In order to do this, program the data logger's serial I/O for a block header of DC2 and a block trailer of DC4.

- The Digitrend® 245 can be programmed for periodic logging in the usual manner while in the simplex mode. To record periodic logs onto disk, program the data logger to use DC2/DC4 for block header/trailer or leave the data storage unit in the WRITE mode.

DUPLEX MODE

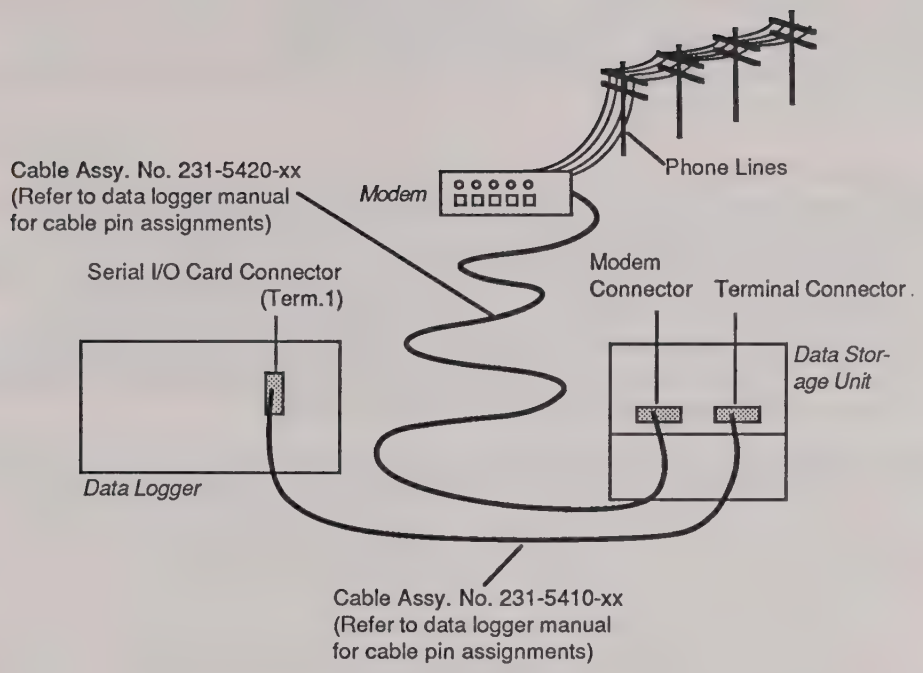


Hookup Configuration

Operation

Operation is similar to that described for simplex mode, except that the data logger can be accessed through its serial port using a computer/terminal connected to the Digitrack™ 360's modem connector.

• With the system hooked up as shown above, place the Digitrack™ 360 in the ONLINE mode via its front panel ONLINE button to access the data logger for logging or programming.



Hookup Configuration

Operation

Operation is basically the same as that described for Duplex mode. We recommend you try modem operation using two local phone lines first (i.e. office extensions). Then, after being familiar with the system and its capabilities, you can confidently transfer data over long distance lines without incurring unnecessary charges.

- If the Digitrack™ 360 is ONLINE when it is called, it will stay ONLINE and you will have access to both the data storage unit and the data logger.

- If the Digitrack™ 360 is OFFLINE when it is called, the unit will go ONLINE and you will have access to the data storage unit only.

- There are two ways to access the Digitrend® 235/245 data logger if the Digitrack™ 360 was OFFLINE at callup:

(1) Hang up the modem or send a CONTROL P (you may need to send more than one CTRL-P to have the Digitrack™ 360 hang up its modem). Dial up the unit again—you will then have access to both units.

(2) Start a file which records every command sent to the data logger and the data logger's response (if any) by sending the ;WO *filename* (use an appropriate filename) command. (Refer to Chapter 7 for a complete discussion on mnemonic commands.) With this file, you can record data logged during the communication session. This is also a good way to record how you programmed the data logger if any data logger programming was done over the modem.

- If the Digitrack™ 360 was ONLINE before you called it and you want the unit to be OFFLINE (returned to data logger control) when you hang up, put the unit in the write mode first (send CONTROL R), then hang up modem. If the Digitrack™ 360 was OFFLINE before it was called and you used a ";WO" command to access the data logger, send a CONTROL T to stop WRITE, then hang up the modem—the unit will go OFFLINE. *Hanging up the modem without doing the above causes the Digitrack™ 360 to remain ONLINE, which inhibits the terminal interface.* In this situation, the unit will not record data if the data logger was set for periodic logging.

Also refer to Chapter 8 for a complete discussion on the use of an Autoanswering modem.

Chapter 5
OPERATION

INTRODUCTION

The disk system is controlled either from the front panel buttons or by commands over the Terminal or Modem interfaces. The controlling interface is selected by the front panel ONLINE button or on power up as determined by switch SW3-3 on the back panel. There are two main modes of operation, READ and WRITE, and when not engaged in either of these, the unit is said to be in STANDBY. The following is a brief description of the read and write modes, both of which are explained in detail later in this chapter.

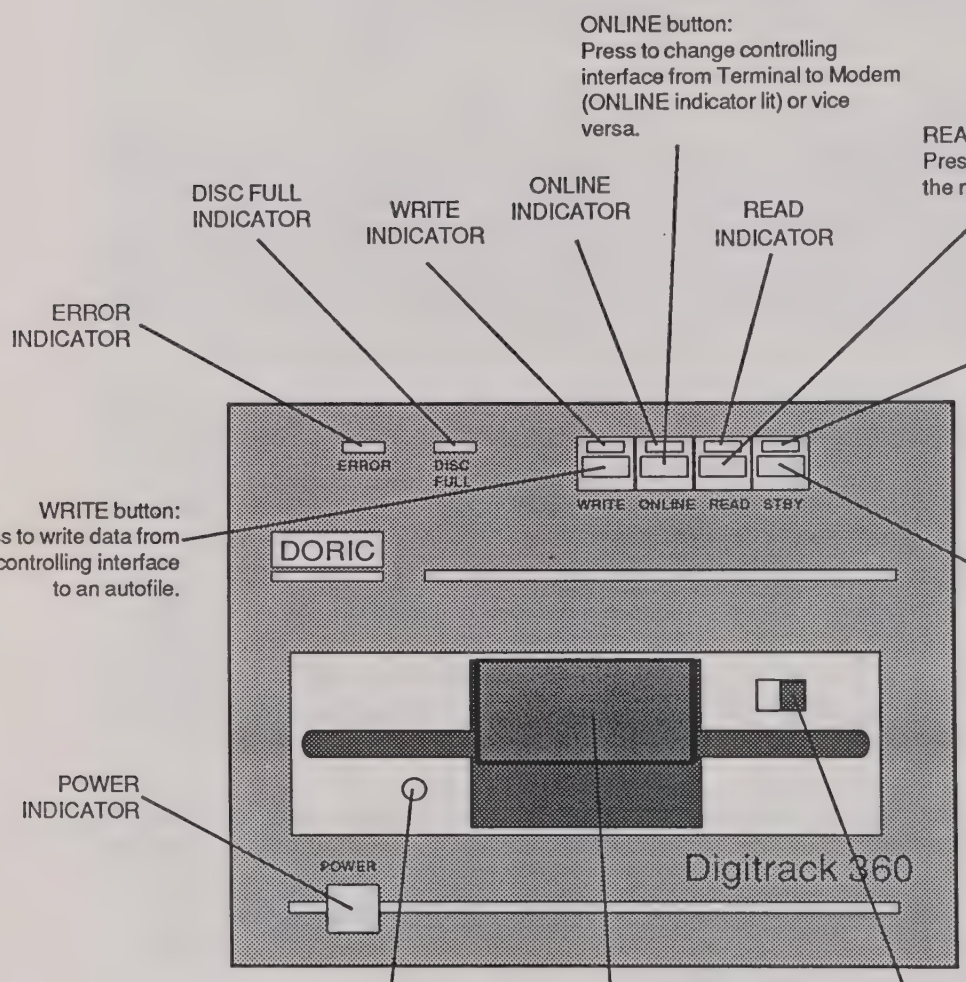
Data entering the unit is buffered before being written to the disk in clusters made up of two 512 byte sectors. Each sector has a unique address on the disk. The data has a two byte cyclic redundancy check (CRC) character added which is used for read-after-write error correction, and verification of the data on subsequent re-reads. A number of clusters may be grouped together to form a file. Each file is given a unique name either by you or automatically by the unit. A disk may hold just one long file, or many smaller files. All file handling and cluster allocation is handled automatically by the unit. Thus, the host system is relieved of all normal disk operating functions. As part of the Write operation, the unit maintains a disk directory which is a record of all files on the disk and the amount of disk space left. The request for disk directory information is given over the controlling interface as needed. Refer to Chapter 7 for the full discussion on the disk directory.

Files are read sequentially or randomly accessed by specifying a filename. When a file is read, it is transmitted either in its entirety, or line by line, 80 characters at a time, depending on the unit's configuration. Data is read from the disk one cluster at a time, decoded, verified (CRC), and buffered before being transmitted. The CRC character is used to ensure no data errors. If an error is encountered, the cluster will be reread up to 10 times before an error indication is given by the unit.

The front panel LED indicators give a quick visual indication of the unit's operating status. When requested by the host, the unit also sends a 7-byte ASCII string containing detailed status information. In addition to the information conveyed by the front panel indicators, the status string information includes ready status, disk write protect status, and error mode. Refer to Chapter 7 for a complete discussion on the status string.

Front panel operation of the Digitrack™ 360 is summarized on the next page. Please refer to appropriate sections of the manual for detailed aspects of operation.

FRONT PANEL OPERATION


ONLINE button:
Press to change controlling interface from Terminal to Modem (ONLINE indicator lit) or vice versa.
READ button:
Press to read data from the next file on the disk.
DISC FULL INDICATOR
WRITE INDICATOR
ONLINE INDICATOR
READ INDICATOR
ERROR INDICATOR
STANDBY INDICATOR
ERROR
DISC FULL
WRITE ONLINE READ STBY
WRITE button:
Press to write data from the controlling interface to an autofile.
DORIC
STBY button:
Press to exit Read or Write modes—unit placed in Standby mode.
Press STBY when unit is already in Standby to clear error indications and to reset file and sector pointers.
POWER INDICATOR
POWER
Digitrack 360
DISK DRIVE INDICATOR:
WHEN LIT, UNIT IS PERFORMING A READ OR WRITE OPERATION—
DO NOT DISTURB DISK WHEN THIS INDICATOR IS ON
DISK ACCESS DOOR
DISK ACCESS DOOR LOCK:
SLIDE LEFT TO LOCK

NOTE 1: Press WRITE and STBY buttons together for 5 seconds to **format** disk. See Chapter 4.

NOTE 2: Set back panel switch SW3-1 ON to **disable** all front panel buttons.

MEDIA

The Digitrack™ 360 uses standard 5 1/4", soft sectored, double-sided, double density floppy disks (Maxell MD2-D or equivalent). A disk need not be preformatted since the Digitrack™ 360 can format the disk itself. The 5 1/4" floppy disk is illustrated in Figure 1. Insert the disk in the disk drive, label side up with the edge nearest the recording area in first.

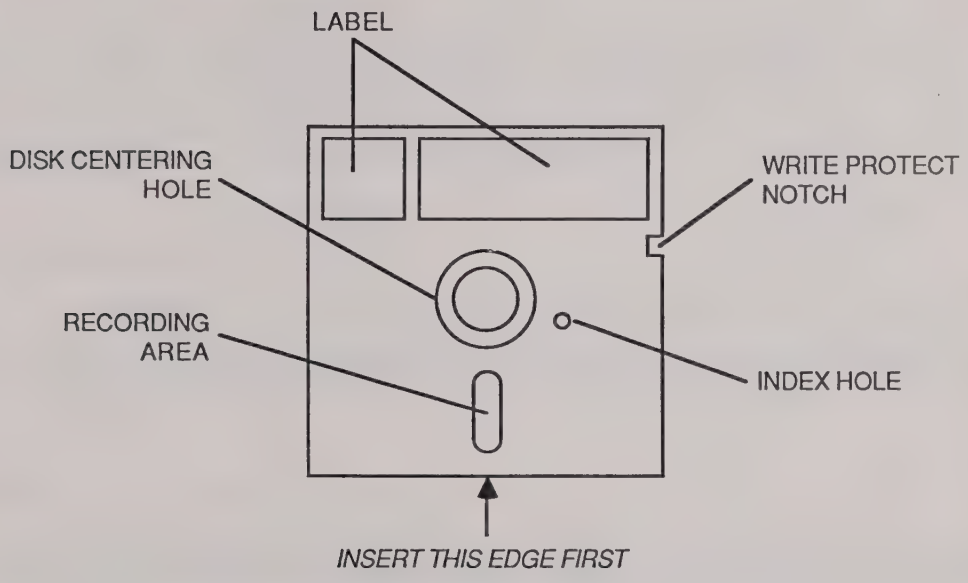


FIGURE 1. 5 1/4" FLOPPY DISKETTE

The media is a coated mylar flexible disk which is free to rotate inside a stiffer plastic jacket. The jacket is lined to provide a little cleaning action as the disk is being used. There are four holes in the jacket which are used as follows:

1) Write Protect Notch: With the notch uncovered, data is allowed to be written onto the disk. With the notch covered with a special tab (supplied with blank disks), data cannot be written onto the disk—only a read operation of the disk's data can be performed.

2) Index Hole: Used to tell the disk drive that the disk is rotating—a hole in the mylar disk passes the index hole on every revolution (about five times a second). The index hole is also used by the internal software when formatting the disk.

3) Disk Centering Hole: The disk drive clamps the disk in this hole in order to rotate the disk.

4) Recording Area: The exposed area of the disk over which the disk drive recording head performs the read/write operations.

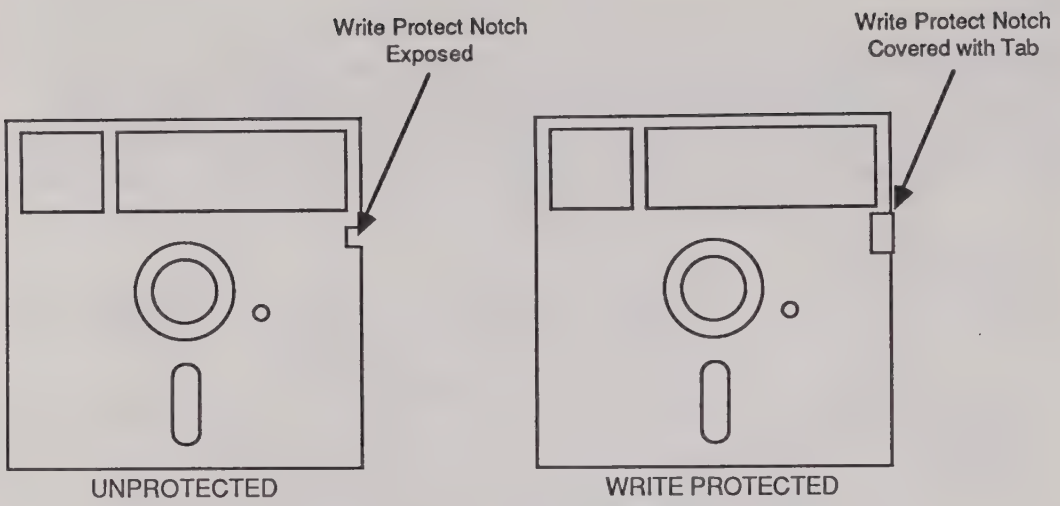


FIGURE 2. UNPROTECTED AND WRITE PROTECTED DISKS

When brand new disks are to be used, they must *not* be write protected before being formatted.

Care of Disks

Floppy disks are not particularly rugged but they will last many years with a little care. Here are some simple rules which will give extended disk life and ensure its data integrity:

DO...

...replace the disk in its protective sleeve whenever it is not in the drive.

...insert the disk very carefully into the drive.

...store the disk between 10–50 °C (50–125 °F).

NEVER...

...touch the recording area.

...bend or fold the disk.

...place near a strong magnetic field, this includes power supplies, VDTs, and TV sets.

...write on the disk label with a pencil or ball-point pen as damage to the recording surface may occur. Use a felt tip pen instead to record information on the label. Better yet, write the disk information on the blank (unused) label first, then stick it onto the disk.

...leave disks in strong sunlight as the heat may distort its shape. If disks have been left overnight in a car or in a cold room, they may not operate correctly first thing in the morning. Allow the disk to acclimate itself in the new environment for at least 40 minutes before use.

INTERFACE CONFIGURATION

The unit has two RS-232C serial interfaces over which data may be passed. The controlling interface is selected by the ONLINE button on the front panel or on power up by switch SW3-3 on the back panel. The flow of data is governed by the ONLINE button togeth-er with the setting of the Monitor and Duplex switches. The data flow is as shown in the communications configuration table in the appendix.

ONLINE/OFFLINE

When the ONLINE indicator is lit, the unit is said to be ONLINE and the Modem Interface has control of the data read/write. When the ONLINE indicator is not lit, the Terminal Interface has control of the data read/write and the unit is said to be OFFLINE.

STANDBY AND ERROR CLEARING

Whenever the unit is not performing a Read or Write operation, it is said to be in the Standby mode; the STBY indicator is lit on the front panel. The unit must be in standby before changing any of the operating conditions, i.e., Online, Baud Rate, etc. Press the STBY button while in the standby mode to clear any error indications.

PREPARING A NEW DISK (FORMATTING)

Before a disk can be used by the unit, it must contain the correct track and sector address information. The operation that writes this information onto the disk is known as "formatting". After inserting the disk into the Digitrack™ 360's disk drive, the Formatting mode may be entered in one of two ways:

1) Press the front panel WRITE and STBY buttons together for five seconds.

2) Send the formatting command over the controlling interface (refer to Chapter 7).

When the unit formats a disk, both WRITE and disk access indicators light up. The unit places "X" characters in the 8 positions normally allocated to the title on the directory track if formatting was initiated from the front panel or if the formatting command contained no disk title.

The Formatting mode cannot be entered if the disk drive contains a write protected disk.

While the unit formats a disk, the front panel buttons are locked out (have no effect) and all commands—except status request—are ignored.

The unit formats disks into 512-byte sectors (blocks), nine sectors per track, 40 tracks per side. If an error occurs while formatting, the format operation stops and the front panel ERROR indicator lights up. In this case, the error is a write error. This is indicated in the status string by a "W" character in byte #4 (refer to Chapter 7 for status string information).

You should format a number of disks before using the unit to ensure uninterrupted logging of large amounts of data. The formatting of each disk takes about one minute. Once formatting is complete, the WRITE indicator turns off and the STBY indicator turns on as the unit enters the Standby Mode.

WRITING

When the unit is placed in the Write Mode, it will write to disk any data sent over the controlling interface. Write mode may be entered when the unit is in Standby provided that a non-write protected disk is in the drive. There are two ways to enter the Write Mode:

1) Press the WRITE button on the front panel.

2) Send the correct command over the controlling interface. (Commands are detailed in Chapter 7.)

While in the Write mode, the WRITE indicator is lit. If the host asks for the status at this time, the write mode will be indicated in the status string ("W" character in byte #3—refer to Chapter 7 for information on the status data given to the host).

If the front panel WRITE button is used, or if no filename is specified in the write command, the unit will automatically give a filename in the series Z001, Z002, Z003 etc. Any number of these automatic files may be written up to the capacity of the disc or directory. When commanded to enter the Write mode, the unit first checks the directory if the disk. It will *not* enter the Write mode if any one of these conditions exist:

1) The disk is write protected.

2) The disk or directory is full.

3) The disk directory cannot be read.

4) The disk has been incorrectly installed in the disk drive.

A write error results if the unit cannot enter the Write mode. The error is shown on the front panel by a lit ERROR indicator and reflected in the status string (refer to Chapter 7).

When the unit enters the Write mode, it opens a file in the directory, then positions the recording head of the drive. A few seconds may occur between the unit being commanded to enter the Write mode, and it being able to accept data. During this period, the unit will try to halt incoming data by use of the relevant handshake signal (explained in Chapter 6). The unit will also indicate in the status string that it is not ready for data.

Before being written to disk, the incoming data is first placed into a memory buffer until 1024 bytes of data is received, or the Write mode is terminated. If the back panel ASCII/ Binary switch SW4-3 is ON, data is written to disk as received (binary). With this switch OFF, bit 8 of the data is set to 0 before being written to the disk—this conforms to the IBM PC ASCII data format.

Writing continues down the disk until the disk is full or the Write mode is terminated.

Exiting the Write mode may be acheived by:

1) Pressing STBY on the front panel.

2) Sending a stop write or reset command over the controlling interface.

3) Entering Autoanswer mode (refer to Chapter 8).

When Write mode is terminated, the unit writes to disk any data left in the buffer. After the buffer is empty, the unit returns the disk head and updates the directory. Only when the directory has been updated does the WRITE indicator turn off and the unit placed in Standby.

The commands for entering and exiting the Write mode as well as permissible filenames are fully explained in Chapter 7.

Disk Full Indication

When a disk has 1024 bytes of free space left, the disk full status is given in the status string (refer to Chapter 7) and the DISC FULL indicator on the front panel flashes to warn you that the disk is close to being full. Action taken by the unit when a disk is completely full depends on the setting of switch SW3-2, Non-continuous/Continuous Mode Select:

Non-continuous Mode

Set switch SW3-2 OFF to select the Non-continuous mode. The early warning disk full indication (flashing indicator) is given as outlined above. If the host continues to send data, the data is written to the last two sectors. When sufficient data is received, the unit

attempts to stop the data input by activating the appropriate handshake as described in Chapter 6. When the data has been written and the directory updated, the unit exits the Write mode and goes into the Standby mode with the front panel DISC FULL indicator lit steady. If multiple Write errors occur at this time, it is possible that the data will not be written onto the disk, this data will be lost. To ensure that all data is written correctly, it is advisable that the host request status information to check for write errors after each 1024 bytes of data has been sent to the unit.

Continuous Mode

Set switch SW3-2 ON to select the Continuous mode. Action is as described above, except that when the data has been written, the unit does not exit the Write mode. The DISC FULL indicator will light steady as the unit attempts to stop data input by use of handshake signals. The directory of the full disk is updated and the unit waits for a new disk to be inserted—remove the full disk from the drive and replace it with a new (not full) formatted disk. Then press the WRITE button. The new disk is checked, and if it's OK, a file is opened on the disk using the same filename as given on the previous (full) disk. If that filename already exists on the new disk, then an autofile is created. If the new disk is not formatted, the unit gives a write error indication. With a correctly formatted disk, the unit activates the appropriate handshake signal to resume data transmission. The remainder of the data is then written onto the new disk.

Write Errors

Unless defeated by setting switch SW1-7 on the back panel ON, data written to disk is automatically verified by means of its CRC character. If a write error occurs, then the data will be written in the next free sector; the unit will attempt to write the data on every free sector until a good sector is found or the disk becomes full. If the Continuous mode is selected, the full disk may be changed so that writing may continue on the new disk. After three consecutive errors have occured, the unit gives a write error indication. The unit may now be requested to abort the Write mode immediately by sending an ASCII DLE command over the controlling interface. The host is not normally aware of a write error on a single sector as the unit buffers all data still being received. If, however, the buffer becomes full while rewriting is taking place, the unit attempts to stop data input with the data control handshaking (refer to Chapter 6). Status and stop write commands are still accepted by the unit when handshakes are inactive. This allows appropriate action by the host.

To clear the error indication, press the STBY button with the unit already in Standby or send the reset command over the controlling interface.

Writing Binary Data

The unit will respond to a number of commands sent over the controlling interface as described in Chapter 7. If the host is attempting to write binary data to disk, then it is possible that the binary data will be seen by the unit as a command and possibly stop writing. For this type of application, use the transparent mode which causes the unit to ignore all commands. For a full description of the Transparent mode, refer to Chapter 7.

The IBM PC format normally sets bit 8 of data written to disk to "0". If binary data is to be recorded, then switch SW4-3 on the back panel must be selected ON.

Power Fail Recovery

Set back panel switch SW3-4 ON for power fail recovery in the event of unexpected power loss. Thus, if the unit is in the write mode when power is lost, the unit will resume writing when power returns. A battery backup circuit is used to save the data in the buffer and the status of the machine, so that when power returns, the unit continues as before. Provided that the data input is halted when the handshake lines go inactive, there should be no data lost.

READING

As previously explained, data is read from a disk 1024 bytes at a time, verified by means of the CRC character, and placed in memory before being output. Data may be output one file at a time, or 80 characters at a time depending on the setting of switch SW2-3 on the back panel (refer to Chapter 4).

Read mode may be entered when the unit is in Standby provided that a disk is in the drive. There are two ways to enter the Read Mode:

1) Press the READ button on the front panel.

2) Send the correct command over the controlling interface. (Commands are detailed in Chapter 7.)

While in the Read mode, the READ indicator is lit. If the host asks for the status at this time, the Read mode will be indicated in the status string ("R" character in byte #3—refer to Chapter 7 for information on the status data given to the host). The unit keeps a record of the last file read. When asked to read either from the front panel or controlling interface (ASCII DC 1), the unit checks the directory entry against this record and outputs the next file. A Read request gives the first file on the disk if the Read request is the first one after power up, or if a disk has just been put in the disk drive. Subsequent pressing of the READ button reads the next file on the disk. When the last file is read, the unit gives the first file again on receipt of the next read command. Pressing the STBY button

immediately after having pressed the READ button causes the unit to step to the next file without transmitting data.

When the host calls for a specified file, the unit checks the disk directory to see if the file exists. If there is no such file, a "?" character is given in byte #3 of the status string and no data is output. If the file exists on the directory, then the disk drive head is stepped by the unit to the beginning of that file to read the data. The Read mode is exited and the unit placed in standby when the last character of the file is given.

The Read mode can be exited at any time by pressing the front panel STBY button or by sending the reset command over the controlling interface.

Read Errors

Unless defeated by setting switch SW1-7 on the back panel ON, data read from disk is automatically verified by means of its CRC character. If the unit fails to read data on a disk, it will attempt, for up to nine more times, to re-read and correctly verify that data. After the 10th attempt has failed, the Read mode exits and the front panel ERROR indicator lights up. If switch SW1-7 is ON (ignore CRC), the unit stays in the Read mode, transmits the data as read and continues reading, In this case, the ERROR indicator lights up. The status string will also indicate a Read error ("R" character in byte #4). If the unit cannot read a sector address on the disk after 10 attempts, it will immediately abort the Read mode regardless of the setting of switch SW1-7.

To clear the error indication, press the STBY button with the unit already in Standby or send the reset command over the controlling interface.

Chapter 6
DATA CONTROL (HANDSHAKING)

INTRODUCTION

The unit will normally accept data at the highest baud rate continuously; however, should rewrites to the disk occur or the disk becomes full, the unit will attempt to stop the incoming data. Similarly, the host may wish to temporarily halt data output from the unit. This control of data flow is known as *handshaking*. The unit can be switch configured to respond to either of the two control lines incoming and outgoing as well as software control (Xon and Xoff).

Input Handshake

The unit attempts to stop incoming data when the internal buffer is within 64 bytes of being full or when the disk itself is completely full. If switch SW3-7 on the back panel is ON, the unit sends an ASCII DC3 (Xoff) to stop incoming data. Then, when the buffer full condition has been cleared, the unit sends an ASCII DC1 (Xon) to resume incoming data.

Additionally, one of two RS-232 lines, as selected by switch SW3-6, is toggled low/high by the unit to signal the source (host) as appropriate. The table below shows the interface pins which are active with a particular setting of switch SW3-6:

SW3/6	OFFLINE (Terminal)	ONLINE (Modem)
ON	Clear to Send (pin 5)	Request to Send (pin 4)
OFF	Data Set Ready (pin 6)	Data Terminal Ready (pin 20)

For input handshaking using RS-232 signals, the unit drives the selected interface line (see table above) low to inhibit input from the host or high to resume input from the host.

The unit signals a communications error if the host keeps sending data when the unit has attempted to stop the input. The error is shown on the front panel with a lit ERROR indicator and in the status string by a "C" character in byte #4. To clear the error indication, press the STBY button with the unit already in Standby or send the reset command over the controlling interface.

The unit does not exit its current mode when a communications error exists. However, all incoming data will be ignored, except for control codes, until the unit is ready for more data. Data can only be accepted by the unit when 1024 bytes are free in the buffer.

Output Handshake

Provided that the unit is not in the transparent mode, data output to the host (Read mode) can be halted by the host sending an ASCII DC3 (Xoff). Data output can then resume when the host is ready for more data, by the host sending an ASCII DC1 (Xon).

Additionally, one of two RS-232 lines, as selected by switch SW3-8, can be toggled low/high by the host to stop/start respectively the unit's data output. The table below shows the interface pins which are active with a particular setting of switch S3-8:

SW3/8	OFFLINE (Terminal)	ONLINE (Modem)
ON	Request to Send (pin 4)	Clear to Send (pin 5)
OFF	Data Terminal Ready (pin 20)	Data Set Ready (pin 6)

For output handshaking using RS-232 signals, the host must drive the selected interface line (see table above) low to inhibit output from the unit or high to resume output from the unit.

Chapter 7
COMMANDS

The unit can be fully controlled over the controlling interface through the use of ASCII control codes or mnemonic commands provided that the transparent mode is not selected. The host system should allow 100 milliseconds after issuing a command to enable the unit to react before taking further action. You must use upper case letters for all commands (lower case letters are not recognized by the unit).

CONTROL CODES

Control Code Table

Control Code	*ASCII Char.*	*DEC. VALUE*	*HEX. VALUE*	*Function*
CTRL P	DLE	16	10	RESET
CTRL Q	DC1	17	11	READ (Xon)
CTRL R	DC2	18	12	WRITE AUTO FILE
CTRL S	DC3	19	13	STOP READ (Xoff)
CTRL T	DC4	20	14	STOP WRITE
CTRL]	GS	29	1D	STATUS REQUEST

CTRL P (ASCII DLE)

This command duplicates the action of the STBY button on the front panel. Receipt of this control code will cause the unit to exit the Read or Write modes but not the Format mode. Send this command when the unit is already in Standby to clear all error indications.

CTRL Q (ASCII DC1)

This is equivalent to the Xon command. Receipt of this code causes the next file to be output if in the Standby mode, or if in the Read mode, resumes the data output which was stopped by a CTRL S (ASCII DC3) or Xoff command.

CTRL R (ASCII DC2)

On receipt of this command, the unit goes into the Write mode as an autofile is opened on the current disk directory in the series: Z001, Z002, Z003 etc. Any data received is written to disk except for valid control codes (if transparent mode is not selected). The only control codes valid in the Write mode are Status Request (CTRL]), Reset (CTRL P), and Stop Write (CTRL T).

CTRL S (ASCII DC3)

This command, which is equivalent to the Xoff command, is valid only in the Read mode. On receipt of this command, the unit stops sending data to the host while still remaining in the Read mode. The front panel indicators and status string are unaffected by this command. A CTRL Q (Xon or DC1) command resumes the data output.

CTRL T (ASCII DC4)

This command is valid only in the Write mode. On receipt of this command, all data sent to the unit but not yet written to the disk will now be written. The Write mode then exits to the Standby mode (WRITE indicator OFF/STBY indicator ON) after the directory track is updated.

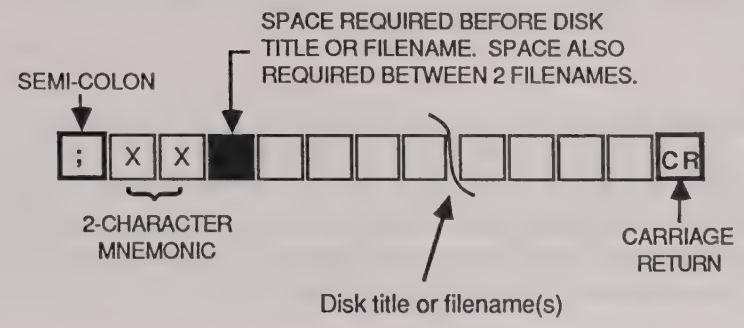
CTRL] (ASCII GS)

This command causes the unit to send a 7-byte serial string detailing its current status. The format of the Status string is given below, after the discussion of the mnemonic commands. Status request is valid in all modes except for the transparent mode in which the command will merely be recorded onto the disk.

MNEMONIC COMMANDS

Mnemonic commands are used through the controlling interface for specific random access of data to/from the disk. The format is as follows:

MNEMONIC COMMAND FORMAT



NOTE 1: All commands must begin with a semi-colon and end with an ASCII CR as shown above in heavy outline.

NOTE 2: Disk title or filename(s) may be up to 8 characters in length and must be alphanumeric. Any lower case character is automatically converted by the unit to upper case.

TABLE OF MNEMONIC COMMANDS

COMMAND	FUNCTION
;DR cr	Directory of Current Disk
;EF FILENAME cr	Erase specified file
;EA *TITLE*cr	Erase all files, optional new disk title
;FD *TITLE*cr	Format disk, optional disk title
;RF FILENAME cr	Read specified file
;WF FILENAME cr	Write specified file
;RO FILENAME cr	Read specified file and output to other interface
;WO FILENAME cr	Write file from other interface
;RN FILENAME1 FILENAME2cr	Rename filename1 to filename2

;DR (Directory Request)

On receipt of this command, the directory of the current disk is output. The directory format and byte structure is discussed after the status string discussion.

;EF **FILENAME** (Erase specified filename)

The specified file is deleted from the directory. If the file is not found on the disk, a "?" character is given in the status string in byte #4.

;EA *TITLE* (Erase all files, optional new disk title)

This command erases all files from the directory of the current disk. If a title is specified (8 characters max.), then the disk is retitled. If no title is specified, then the existing disk title remains in force.

;FD *TITLE* (Format Disk, optional disk title)

This command formats the current disk and names it if a disk title is specified (8 characters max.). If no title is specified, the disk title defaults to 8 "X" characters: XXXXXXXX. For a full description of disk formatting, refer to Chapter 5. If a power failure occurs while a format is in progress, then the disk will be corrupted.

;RF **FILENAME** (Read specified file)

With this command, the unit searches the directory to find the specified filename then outputs the data in the form specified by the back panel switches. Refer to Chapter 5 for the discussion on the Read mode.

;WF **FILENAME** (Write specified file)

With this command the unit writes data in a file as specified by the filename. Refer to Chapter 5 for the discussion on the Write mode.

;RO **FILENAME** (Read specified file and output to other interface)

With this command, data is read from the specified file and given to the device connected to the non-controlling interface as well as the device connected to the controlling interface (that is, the device that initiated the command. See the Communications Configuration chart and diagrams in the Appendix for data flow paths.

;WO **FILENAME** (Write file from other interface)

With this command, data is written to disk in the specified file from the other interface. However, the controlling interface must terminate the Write mode. See the Communications Configuration chart and diagrams in the Appendix for data flow paths.

;RN **FILENAME1 FILENAME2** (Rename a file)

With this command, an existing filename (FILENAME1) is given a different name (FILENAME2). The disk title is treated as a filename; thus, it can be similarly renamed. If the filename given for Filename1 does not exist, of if Filename2 already exists on the

directory, the ERROR indicator on the front panel will light and a command error will be shown in the status string (see next).

STATUS STRING

The unit can be controlled remotely over either of its two RS-232 interfaces. When operating remotely, the host may require information to enable it to monitor and interpret the state of the unit. This information is provided in the form of a 7-byte status string which may be called for as required, provided the unit is not in the transparent mode, by sending an ASCII GS (Control]) command to the unit. Each byte of the status string is explained below. The status string is also summarized in the appendix for your convenience.

Byte 1. *Ready status for command/data input*
"^" (circumflex) = ready
"." (period) = not ready

Byte 2. *Write protect status*
"P" = disk protected, read only
"." (period) = disk unprotected

Byte 3. *Operating mode status*
"R" = Read mode
"W" = Write mode
"." (period) = Standby mode

Byte 4. *Error Status*
"C" = Communication error, host does not respond to handshake
"R" = Read error
"W" = Write error
"?" = Command error
"." (period) = No error

Byte 5. *Disk Space Status*
"F" = Disk full. This byte is set to "F" when 1024 bytes remain free on the disk. This byte will remain set to "F" until a new disk is put in the drive, or data is deleted from the current disk.
"." (period) = Disk not full

Byte 6. *Line Feed*

Byte 7. *Carriage Return*

Note: The write protect byte, byte 2, is updated whenever the unit enters or exits a mode or after a reset command. Changing a disk will not update this byte until one of the above is performed.

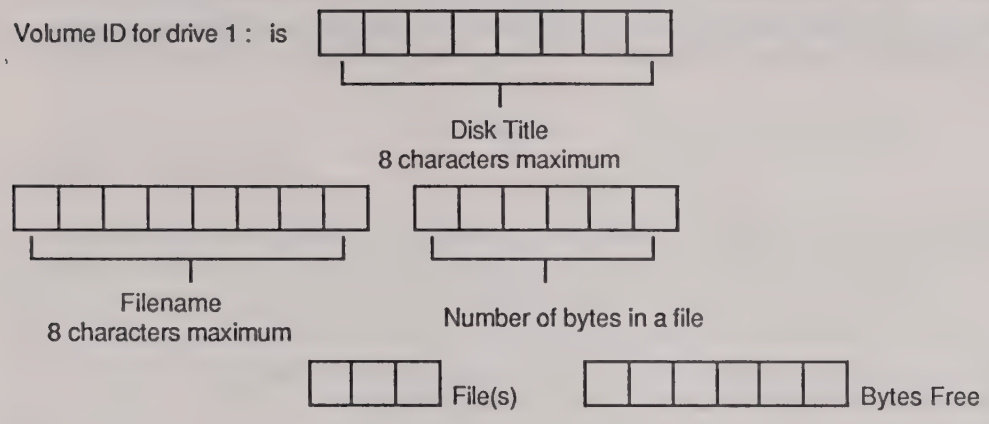
DIRECTORY

All data written to disk is formed into files. The unit keeps a record of these files, called a directory, on each disk. The host may view the directory by issuing the ;DR command as described previously.

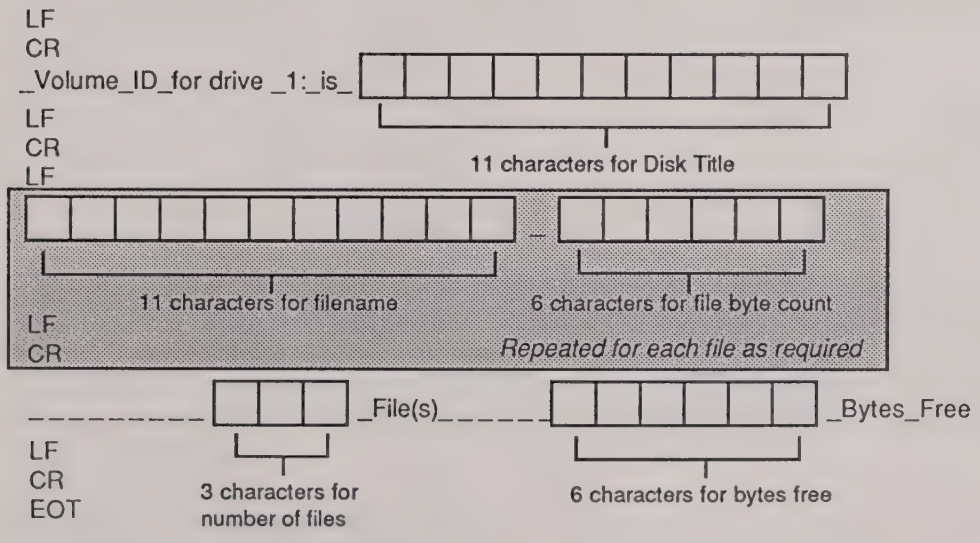
As shown on the next page, the directory is presented in ASCII, with a disk title (set to all "X" characters if no title has been specified) followed by disk information. Each file is listed with the number of bytes in the file. Any file not given a filename is named automatically by the unit in the series Z001, Z002, Z003 etc. The directory is preceeded by a line feed and carriage return, and followed by a line feed, carriage return, and end of text character.

The unit will only write an 8-character alphanumeric title or filename; however, it can read up to 11 characters in that position. This allows the reading of disks written on other systems. All filenames are automatically converted to upper case characters by the unit.

Directory Format:



Directory Byte Structure:



The disk and file titles start at the first character position. Any character positions not used are given as spaces. For byte counts, leading zeros are given as spaces. When the count is actually zero, i.e., no bytes free, then the final character will be zero. In the above format, a space is shown by an underscore (_).

TRANSPARENT MODE

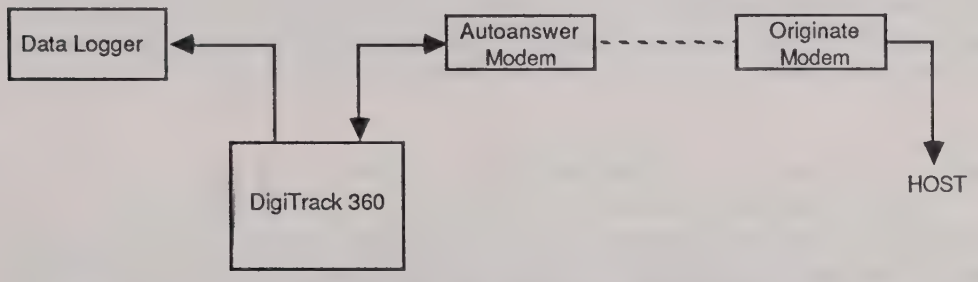
The unit responds to a number of control codes and mnemonic commands passed over the controlling interface. If the writing of binary data to disk is required, then it is possible for the data to contain characters which coincide with these commands and, for example, terminate the Write mode. By placing the unit in the transparent mode, all control codes are

written to disk and not acted on. Each interface can be switched independently to transparent: Use back panel switch SW4-7 to select Modem Transparent and switch SW4-8 for Terminal Transparent. Be aware that even if the data appears not to contain control codes, some devices may use control codes at the beginning and/or end of the data.

Chapter 8
SPECIAL OPERATING FEATURES

Autoanswer Operation

The unit, in conjunction with an autoanswering modem, can be remotely operated via the telephone lines for remote acquisition and storage of data. To do this, set switch SW4-5 ON for autoanswer operation and connect an autoanswer modem to the unit's modem interface. When this modem is called, the unit will automatically switch control from the Terminal interface (offline) to the modem interface (online). In this way, all data recorded on disk may be transferred over the phone lines to a computer, terminal, etc. without the need for a site visit.



In the autoanswer mode, the Data Terminal Ready (DTR, pin 20) line at of the modem port is held ON at all times. The unit checks both Data Set Ready (DSR, pin 6) and Clear to Send (CTS, pin 5) of the Modem interface. When both of these signals go ON, the unit communicates over the modem interface. Disconnect occurs if one of these two lines is taken low, i.e. negative. Autoanswer operation is compatible with BELL 212 and 103 autoanswer systems.

When called, the unit responds as follows:

1. If in the Standby mode, the unit becomes Online. Input from the Terminal interface is inhibited.

2. If in the Read mode, the unit is forced Online and in Standby. Input from the Terminal interface is inhibited.

3. If in the Write mode, the unit writes all data in its buffer to disk, updates the directory, closes the current file, and enters Standby. The unit is then forced Online and the Terminal input is inhibited.

However, if switch SW4-4 is set ON for Autoanswer monitor, then...

...the unit stays in Write. Send an ASCII FS character (CTRL <) through the modem to terminate Write. The unit is then forced Online and the Terminal input is inhibited.

Once the unit is switched Online, full control of the unit is given to the Modem interface.

When the Autoanswer modem hangs up, the unit returns Offline and in Standby. If logging of data is required after disconnect, command the unit to enter the Write mode *before* disconnecting the line. Then, upon hang up, the unit remains in Write as it goes back Offline with the inhibit removed from the Terminal input .

Autoanswer Monitor

Set switch SW4-4 ON for Autoanswer monitor. In this mode, data given to the Terminal interface for disk storage is also given to the Modem interface for viewing on a CRT or for immediate data manipulation by the host. The Modem interface remains as the controlling interface when the monitor mode is used. However, as noted above, an ASCII FS (CTRL <) must be used to stop Write and transfer control to the modem if the unit is in the Write mode when called.

Monitor

Set switch SW4-2 ON to monitor data received by the Modem interface. In this mode, data sent over the Modem interface can be viewed on the Terminal interface as the unit is writing this same data to disk. The unit responds to software commands or hardware handshake signals on the Terminal interface.

The two interfaces can be set to different baud rates and formats as the unit buffers and converts the data as necessary.

Chapter 9
TIPS ON REMOTE OPERATION USING SOFTWARE COMMANDS

The unit can be controlled manually via the front panel buttons or remotely over either RS-232C interface. You may wish to write a dedicated handler for the Digitrack 360 or incorporate it within existing software. The following notes are given to assist you in writing such software.

When requested, the unit sends a comprehensive status string to the host. This status information includes current operating mode, error condition, etc. By frequently calling for status within a program, the host can be kept fully aware of the state of the Digitrack 360. If the host is reading data from the unit, it is advisable to temporarily stop data flow by sending the Xoff character if machine status is required, otherwise the status characters will be mixed up with the data.

When sending to the unit, it is advisable to check status before sending data to ensure that (a) the unit is ready to accept the data, (b) that no error condition exists, and (c) that the disk is not full. When the disk is full the unit will drop handshake lines and send Xoff (if selected) to inhibit incoming data. If the handshake line are held low, the unit will still send status if requested.

When the unit is commanded to enter the Write mode, it has to check the directory, open a file, and position the head—this takes about two seconds. In order to ensure that no data is lost, status should be checked. The status will show the Write mode a short time after receiving the command, but will not flag "Ready" until it can accept data.

After issuing a command, it is advisable to have a short time delay to ensure that the unit has had time to react. The delay is baud rate dependent, but should be long enough to allow for three characters to be transmitted.

APPENDIX

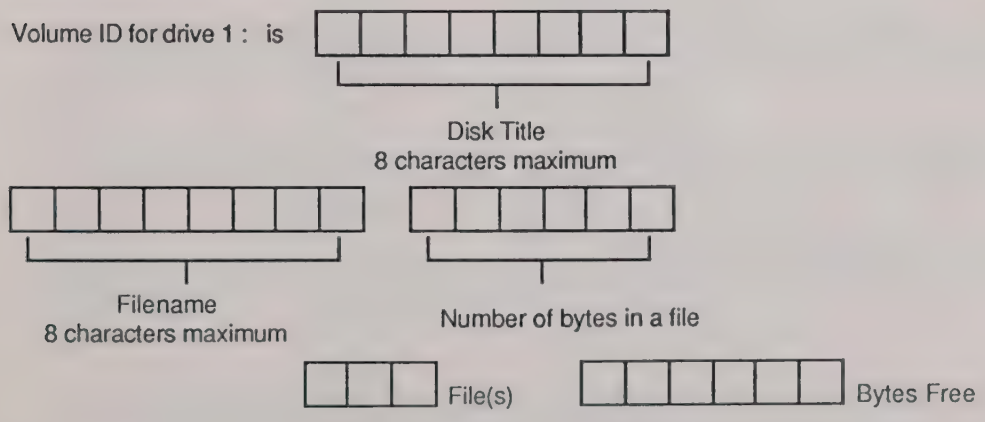
CONTROL CODES

Control Code	*ASCII Char.*	*DEC. VALUE*	*HEX. VALUE*	*Function*
CNTRL P	DLE	16	10	RESET
CNTRL Q	DC1	17	11	READ (Xon)
CNTRL R	DC2	18	12	WRITE AUTO FILE
CNTRL S	DC3	19	13	STOP READ (Xoff)
CNTRL T	DC4	20	14	STOP WRITE
CNTRL]	GS	29	1D	STATUS REQUEST

MNEMONIC COMMANDS

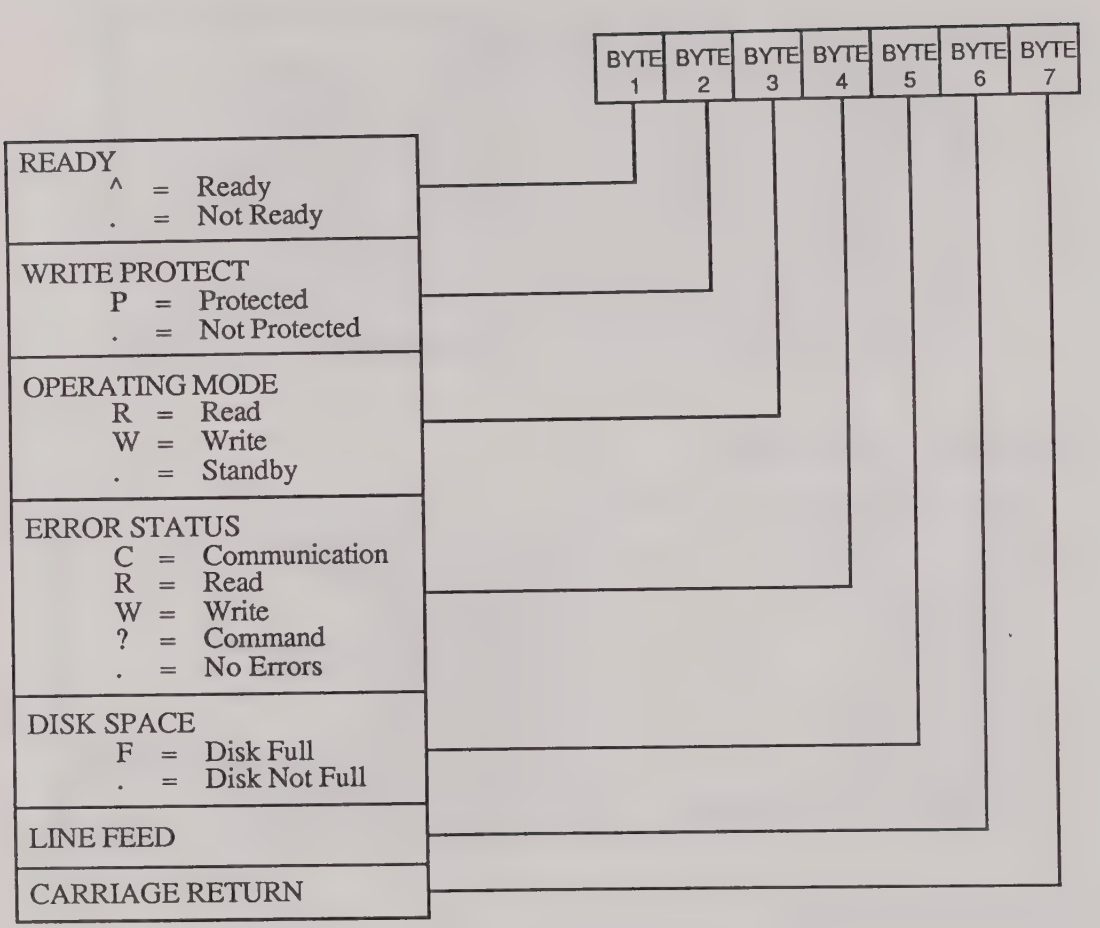
COMMAND	FUNCTION
;DRcr	Directory of Current Disk
;EF FILENAME cr	Erase specified file
;EA *TITLE* cr	Erase all files, optional new disk title
;FD *TITLE* cr	Format disk, optional disk title
;RF FILENAME cr	Read specified file
;WF FILENAME cr	Write specified file
;RO FILENAME cr	Read specified file and output to other interface
;WO FILENAME cr	Write file from other interface
;RN FILENAME1 FILENAME2 cr	Rename filename1 to filename2

DIRECTORY FORMAT



LF/CR/EOT

STATUS STRING



QUICK SWITCH REFERENCE

	POSITION	OPERATION	FUNCTION
SWITCH 1	1, 2, & 3	Baud Rate	Set operating speed of Terminal Interface *
	4, 5, & 6	Baud Rate	Set operating speed of Modem Interface *
	7	CRC Select	ON to *disable* CRC verification OFF to *enable* CRC verification
	8	UNUSED	—
SWITCH 2	1 & 2	UNUSED	—
	3	Line Mode	ON for 80-character line-by-line data output OFF for no line control of data
	4	CR Delay	ON for 250 ms delay of data output after CR OFF for no delay of data output after CR
	5	Parity	ON for no parity OFF for parity
	6	Parity odd/ even select	ON for even parity OFF for odd parity
	7	Modem Stop Bits	ON for 2 stop bits OFF for 1 stop bit
	8	Terminal Stop Bits	ON for 2 stop bits OFF for 1 stop bit
SWITCH 3	1	Front Panel Control	ON to *disable* front panel buttons OFF to *enable* front panel buttons
	2	Write Mode When Full	ON for continuous mode OFF for non-continuous mode
	3	Controlling Intf. at power up	ON for Terminal Interface OFF for Modem Interface
	4	Power Fail Recovery Select	ON for power fail recovery OFF for no power fail recovery
	5	UNUSED	—
	6	Input Handshaking	ON: Pin 4/Modem and Pin 5/Term. controls input OFF: Pin 20/Modem and Pin 6/Term. controls input
	7	Xon/Xoff Control	ON to *enable* Xon/Xoff control OFF to *disable* Xon/Xoff control
	8	Output Handshaking	ON: Pin 5/Modem and Pin 4/Term. controls output OFF: Pin 6/Modem and Pin 20/Term. controls output
SWITCH 4	1	Duplex Select	ON for Full Duplex OFF for Half Duplex
	2	Monitor Select	ON to monitor modem data on terminal interface OFF for no monitor of modem data
	3	ASCII/Binary	ON for binary data recording OFF for ASCII data recording—bit 8 set to "0"
	4	Autoanswer Monitor	ON to monitor terminal data on modem interface OFF for no monitor of terminal data
	5	Autoanswer Select	ON to *enable* autoanswer mode OFF to *disable* autoanswer mode
	6	UNUSED	—
	7	Modem Transparent	ON for transparent Modem interface OFF for normal Modem interface
	8	Terminal Transparent	ON for transparent Terminal interface OFF for normal Terminal interface

** Refer to baud rate table, next page.*

BAUD RATE TABLE

	SWITCH 1					
	Terminal BAUD RATE			Modem BAUD RATE		
FUNCTION	1	2	3	4	5	6
110 baud	OFF	OFF	OFF	OFF	OFF	OFF
150 baud	ON	OFF	OFF	ON	OFF	OFF
300 baud	OFF	ON	OFF	OFF	ON	OFF
1200 baud	ON	ON	OFF	ON	ON	OFF
2400 baud	OFF	OFF	ON	OFF	OFF	ON
4800 baud	ON	OFF	ON	ON	OFF	ON
9600 baud	OFF	ON	ON	OFF	ON	ON
19.2 kbaud	ON	ON	ON	ON	ON	ON

SW1-1 through SW1-6: Baud Rate
Use these switches to set the baud rate for the RS-232 interfaces (Modem and/or Terminal) as required.

USING THE CONVERSION PROGRAM

The conversion program is designed to take the data recorded onto disk by the Digitrack 360 and convert it to a format that can be "imported" by spreadsheet programs such as Lotus' 1-2-3™ or Symphony™†. The import facility of Lotus is limited to 240 characters or seven channels of data. The program will also sort stored files by Transitory Alarms, Point Difference, Rate Alarm, and Point Alarm as generated by the Digitrend® 235/245 data logger. The program can also select out specific times in a file or convert all logs up to its capacity.

NOTE

Your PC must have two disk drives in order to run the conversion program.

Converting Data

1. Start up the PC into the Disk Operating System with the controlling drive being "A". Insert the Conversion Disk into drive A. Insert the disk containing the data to be converted into drive B.

2. Using the keyboard, type MENU. The Conversion Program recognizes capital letters only, so press the CAPS LOCK key. With the menu on display, select the data logger model as determined by the data logger from which the data originated. The next menu gives you four options. Select "C. . Change Default Values".

3. Set values as required (hit carriage return key after each value). Due to the limitation of the import facility of Lotus, only seven points of data can be imported at a time. The conversion program creates files of about 240 characters wide. When all values are entered, answer the question at the bottom of the screen by typing "Y" (no carriage return).

4. Selecting option "B" on the menu instructs the computer to look in the B Drive to show the files on the data disk recorded and named by the Digitrack™ 360. These files are shown in sequential order starting with Z001.

5. Select option "A" on the menu to convert a data logger file. Type the name of the file to be converted (i.e. Z001) followed by a carriage return. The program retrieves the file and puts the starting day of that file in the "Days -From" space. The ending day and the specific times in that file may or may not be selected depending on the size of the file to be converted. After all values are entered, type "Y" (do not hit carriage return after this or else the name of the new file will flash by too quickly on the screen to read).

† Lotus™ 1-2-3™ and Symphony™ are trademarks of Lotus Development Corporation

6. The newly created file containing converted data will have a file name with a ".PRN" suffix (i.e., "ROSER1.PRN" or "DTR1.PRN"). This is the file that Lotus will recognize during importation. A new file will be created for every seven points of data and all files will be stored on the disk containing the conversion program.

7 When the conversion is complete, move the disk containing the converted files to Drive B. Load Lotus into Drive A and bring up the main menu. Select "File", then "Import", then "Numbers". The ".PRN" files available for importation will then be displayed.